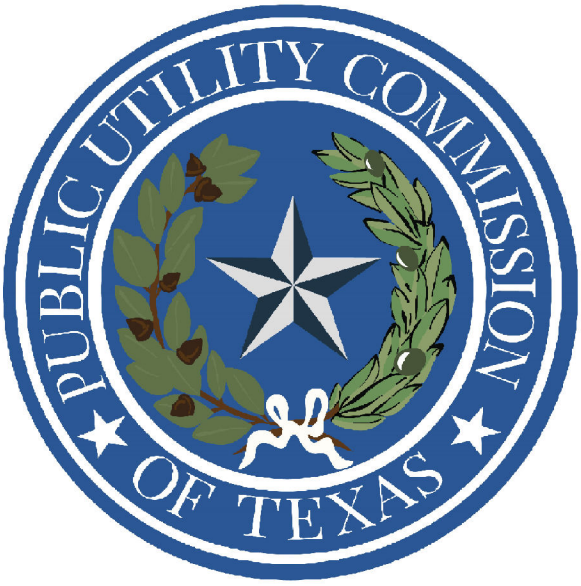

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APPLICATION OF SOUTHWESTERN PUBLIC SERVICE COMPANY TO AMEND ITS CERTIFICATE OF CONVENIENCE AND NECESSITY TO CONVERT HARRINGTON GENERATING STATION FROM COAL TO NATURAL GAS	§ § § § § § § §	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

DIRECT TESTIMONY AND ATTACHMENTS

OF

SCOTT NORWOOD

ON BEHALF OF

THE ALLIANCE OF XCEL MUNICIPALITIES

MARCH 25, 2022

REDACTED

SOAH DOCKET NO. 473-22-1073
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DIRECT TESTIMONY AND ATTACHMENTS OF SCOTT NORWOOD

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME, TITLE AND BUSINESS ADDRESS.

A. My name is Scott Norwood. I am President of Norwood Energy Consulting, L.L.C. My business address is P.O. Box 30197, Austin, Texas 78755-3197.

Q. WHAT IS YOUR OCCUPATION?

A. I am an energy consultant specializing in the areas of electric utility regulation, resource planning and energy procurement.

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I am an electrical engineer with over 35 years of experience in the electric utility industry. I began my career as a power plant engineer for the City of Austin's Electric Utility Department where I was responsible for electrical maintenance and design projects for the City's three gas-fired power plants. In January 1984, I joined the staff of the Public Utility Commission of Texas ("Commission" or "PUCT"), where I was responsible for addressing resource planning, fuel, and purchased power cost issues in electric rate and plant certification proceedings before the Commission. Since 1986 I have provided utility regulatory consulting, resource planning, and power procurement services to public utilities, electric consumers, industrial interests, municipalities, and state government clients. I have testified in over 200 utility regulatory proceedings over the last 20 years, before state regulatory commissions in Alaska, Arkansas, Florida, Georgia, Illinois, Iowa,

Kentucky, Louisiana, Michigan, Missouri, New Jersey, Ohio, Oklahoma, Texas, Virginia, Washington, and Wisconsin.[1]

Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS CASE?

A. I am testifying on behalf of the Alliance of Xcel Municipalities ("AXM").

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to present my evaluation and recommendations regarding Southwestern Public Service Company's ("SPS" or "Company") application to amend its certificate of convenience and necessity to convert the Harrington generating station from coal to natural gas ("Harrington Conversion Project" or "Project") including: (1) the need for the Project and 2) the reasonableness of the Company's consideration of alternatives and cost/benefit analysis ("CBA") supporting selection of the Project.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE PUBLIC UTILITY COMMISSION OF TEXAS?

A. Yes. I have filed testimony in numerous past proceedings before the Commission as a consultant and former member of the PUCT's Staff, including base-rate cases, new-plant certification proceedings, fuel-factor, and fuel-reconciliation cases. I filed testimony on behalf of AXM in several recent SPS cases before the Commission, including SPS's application for approval of acquisition of new wind-energy facilities (PUC Docket No. 46936), the Company's last three base-rate cases (PUC Docket Nos. 47527, 49831, and 51802), SPS's most recent fuel-reconciliation case (PUC Docket No. 48973), and the Company's recent request for approval to modify its fuel-factor formula (PUC Docket No. 51625). I am also currently assisting AXM with its evaluation of SPS's pending fuel reconciliation case (PUC Docket No. 53034). Through these recent past projects, and my representation of AXM in numerous prior cases filed by SPS seeking approval to construct new generating facilities, to change rates or reconcile its fuel expenses, I am quite familiar with SPS's system operations and generating resources and other base-rate-case issues I address in my testimony in this case.

[1] *See* Attachment SN-1 for additional details on my background and experience.

Q. HAVE YOU PREPARED ANY ATTACHMENTS TO SUPPORT YOUR TESTIMONY?

A. Yes. I have prepared 3 attachments which are included with my testimony.

II. SUMMARY OF TESTIMONY

Q. PLEASE SUMMARIZE YOUR TESTIMONY AND RECOMMENDATIONS.

A. My testimony addresses the reasonableness of SPS's request for approval to amend its CCN to proceed with the proposed Harrington Conversion Project. My primary conclusions and recommendations regarding SPS's proposed Harrington Conversion Project are:

1) SPS has a need for the 1,050 MW of firm generating capacity that would be provided by the Harrison Conversion Project;

2) SPS's 2021 Cost/Benefit Analysis ("CBA") for the Harrington Conversion Project forecasts that the Project would produce savings of 1% or less when compared to retirement and replacement alternatives over the 20-year evaluation period (2022-2041);

3) The forecasted economic benefit of the Project is within the margin of modeling error of the Harrington conversion CBA due to uncertainty in forecasting energy prices and unit operating performance of SPS's system within the SPP regional market over the 20-year study period;

4) The converted Harrington units are expected to have relatively short (11-15 year) remaining operating lives and SPS forecasts that the converted units would produce very little energy due to their relatively low operating efficiency and high variable operating costs;

5) The option of retirement and replacement of the Harrington coal units with new gas-fired combustion turbines located at the Harrington site is generally consistent with SPS's 2021 Integrated Resource Plan and would provide several economic and operational advantages over the proposed gas conversion project, including newer more efficient units with much longer operating lives and better ability to back up renewable energy resources;

6) Construction schedule and interconnection cost risk associated with replacement alternatives could likely be mitigated by deferring scheduled retirement of other gas units for several years, short-term capacity purchases and possibly locating new replacement resources at the Harrington plant site; and

7) Based on the above factors and my overall analysis of the Project, I conclude that the proposed Harrington gas conversion project is not the best available option for replacing the 1,050 MW capacity loss caused by the retirement of the Harrington coal units and recommend that the Commission deny SPS's request for approval of the Harrington Conversion Project.

The following sections of my testimony discuss my analysis and support for the above recommendations.

III. SPS'S APPLICATION FOR HARRINGTON CONVERSION PROJECT

Q. WHAT RELIEF IS SPS REQUESTING IN THIS CASE?

A. SPS is requesting approval to retire the coal assets at Harrington effective December 31, 2024 and to amend its existing CCN to convert all three of the Company's Harrington coal-fired generating units to burn natural gas, and to construct, own and operate a new pipeline to supply natural gas to the Harrington Generating Station.

Q. WHEN WOULD THE CONVERSION BE COMPLETED?

A. The Company estimates that the conversion would be completed by the end of 2024.

Q. WHAT IS THE ESTIMATED COST OF THE HARRINGTON CONVERSION PROJECT?

A. SPS estimates that the cost of the conversion project will be approximately $65 million to $75 million (on a Total Company basis), including the cost of the natural gas pipeline.[2]

[2] PUC Docket No. 52485, *Application of Southwestern Public Service Company to Amend its Certificate of Convenience and Necessity to Convert Harrington Generating Station From Coal to Natural Gas*, Application at p. 5 (Aug. 27, 2021).

Q. PLEASE DESCRIBE THE HARRINGTON GENERATING STATION.

A. As summarized in Table 1 below, the Harrington Station consists of three coal-fired generating units located in Potter County, Texas, with a total net generating capacity of 1,050 MW.

Table 1
Harrington Generating Station Coal Unit Capacity Ratings and Commercial Operation Dates[3]

	Net Capacity Rating, MW	Commercial Operation Date	Retirement Date 2021 Analysis
Harrington 1	340	1976	2036
Harrington 2	355	1978	2038
Harrington 3	355	1980	2040
	1,050		

Q. WHY DID SPS DECIDE TO CONVERT THE HARRINGTON COAL UNITS TO BURN NATURAL GAS?

A. The Company indicates that the impetus for the proposed conversion project is that the Harrington coal units were not able to meet the EPA's NAAQS SO2 emission standard of 75 parts per billion as measured based on the 99th percentile of 1-hour daily maximum concentrations.[4] As a result of this problem, SPS was required to develop a plan to achieve compliance with the NAAQS by 2025. After evaluating and concluding that the cost of adding environmental controls to reduce SO2 emissions from the Harrington units to a level necessary to continue operating on coal and comply with the NAAQS would range from $85 million to $185 million, SPS concluded that conversion of the units to burn natural gas was a more cost-effective solution.[5] The Company presented its compliance plan to convert the Harrington units to burn natural gas to the Texas Commission on Environmental Quality ("TCEQ") and an Agreed Order was finalized in October of 2020

[3] Data sources are SPS's response to AXM 1-11 and Direct Testimony of Ben Elsey at p. 18 ("Elsey Dir. at __.").

[4] Direct Testimony of William A. Grant at p. 11 ("Grant Dir. at __.").

[5] Grant Dir. at 13.

providing that SPS would cease coal-fired operations at the Harrington plant by the end of 2024. [6]

Q. WHAT ACTIONS DID SPS TAKE TO CONFIRM THAT CONVERTING THE HARRINGTON COAL UNITS TO BURN NATURAL GAS WAS A REASONABLE AND NECESSARY SOLUTION TO COMPLY WITH THE NAAQS AND MEETING SYSTEM CAPACITY REQUIREMENTS?

A. SPS conducted an initial economic analysis in 2019 whose results SPS claims supported the conversion of the Harrington units to use natural gas. After the Agreed Order was finalized, the Company conducted a Request for Information ("RFI") for replacement capacity and energy to replace the Harrington coal units and in 2021 updated its economic analysis to reflect the bids received through the RFI process. SPS asserts that this updated 2021 economic analysis demonstrated that the Harrington gas conversion project was a prudent solution to comply with the NAAQS and to replace the 1,050 MW of capacity and associated energy production loss resulting from the retirement of the Harrington coal units.[7] The Company further asserts that the Harrington conversion project is necessary to maintain adequate system capacity reserves, to maintain voltage support on its system and to provide reliable backup for the growing level of intermittent renewable energy resources that have been added to the SPS system.

Q. IS SPS REQUESTING ANY COST RECOVERY FOR THE HARRINGTON GAS CONVERSION PROJECT IN THIS CASE?

A. Not at this time.

IV. NEED FOR HARRINGTON CONVERSION PROJECT

Q. WHAT ARE THE KEY ISSUES TO BE EVALUATED IN DETERMINING WHETHER THERE IS A NEED FOR THE HARRINGTON GAS CONVERSION PROJECT?

A. There are several issues that must be evaluated in determining whether there is a need for the Harrington gas conversion project. First, is the issue of the cost of adding emission controls that would be required for continued coal-fired operations of the Harrington coal

[6] Grant Dir. at 12.

[7] *Id.*

units as SPS has determined. I will address this issue later in my testimony. The other key issues to be evaluated in assessing the need for the Harrington gas conversion project are: 1) is SPS reasonably certain of the need to replace the 1,050 MW of capacity resulting from retirement of the Harrington coal units at the end of 2024, and if so; 2) is the conversion project best able to provide the voltage support and renewable energy backup requirements claimed by the Company.

Q. WHAT IS SPS'S FORECASTED SYSTEM CAPACITY REQUIREMENT IN 2025 IF THE HARRINGTON COAL UNITS ARE RETIRED AT THE END OF 2024?

A. As shown in Table 2 below, under the Company's Summer 2021 base demand planning forecast, SPS forecasts that it would be approximately 902 MW short of the required minimum capacity and reserve requirement in 2025 if the Harrington coal units are retired at the end of 2024 and not replaced. As also shown in Table 2 the Company further projects that this capacity deficit would grow to 1,880 MW by 2030 due to other planned resource retirements during that period.

Table 2
Forecasted SPS System Capacity Requirements
without Harrington Coal Units[8]

SPS Planning Table Forecast (Summer 2021 Load Forecast)

	2025	2026	2027	2028	2029	2030
Total Accredited Capacity	4,924	4,608	4,582	4,364	4,249	4,246
Planning Load Forecast	4,264	4,236	4,326	4,400	4,471	4,533
Total Planning Reserve Margin at 12%	512	508	519	528	536	544
Resource Position - Assuming all Harrington Units are Converted (MW)	148	(136)	(264)	(564)	(758)	(830)
Less Harrington 1, 2, 3 (MW)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)
Resource Position - Assuming all Harrington Units are retired (MW)	(902)	(1,186)	(1,314)	(1,614)	(1,808)	(1,880)

Q. COULD THE HARRINGTON UNITS RELIABLY SERVE THE ABOVE FORECASTED NEED FOR CAPACITY ON SPS'S SYSTEM IN 2025 AND THEREAFTER?

A. Yes, that is possible. However, because large gas-fired steam generating units are not ideally suited for daily cycling operations as peaking resources, and because all three

[8] Source of data 1 is SPS's response to AG 2-5.

Harrington units are more than 40 years old, they may experience lower operating availability over the remaining 10-15 years of their service lives.

Q. WOULD THE CONVERTED HARRINGTON UNITS SUPPLY SPS'S NEEDS FOR VOLTAGE SUPPORT AND FOR BACKUP OF RENEWABLE ENERGY RESOURCES AS THE COMPANY CLAIMS?

A. The Harrington units represent over 20% of SPS's total system generating capacity and would provide voltage support to the system. However, I am skeptical of SPS's claim that the gas conversion project is needed to support intermittent operations of the Company's renewable resources. The ramp rates for the converted units is only 2 MW per minute and the Company's production modeling of the converted units did not consider the proposed Harrington gas unit start-up times which are critical capabilities for reliable support of renewable energy resources.[9]

Q. DOES SPS EXPECT THE HARRINGTON GAS UNITS TO PROVIDE SIGNIFICANT ENERGY BENEFITS TO THE SYSTEM?

A. No. SPS's production modeling for the CBA of the gas conversion project indicates that the average annual capacity factors of the converted Harrington units would be less than 0.07% during their first 12 years of service (2025-2036). This raises serious questions regarding the Company's proposal to invest $75 million for conversion and a new gas pipeline for plants, when the converted units are not ideally suited for peaking service and will rarely operate.[10]

Q. DO THE RESULTS OF SPS'S OCTOBER 2020 REQUEST FOR INFORMATION ("RFI") FOR REPLACEMENT RESOURCES DEMONSTRATE THAT THE HARRINGTON GAS CONVERSION PROJECT IS THE BEST OPTION TO REPLACE THE RETIRED HARRINGTON COAL-FIRED CAPACITY?

A. No. The 2020 RFI was initially issued to obtain information on the availability and cost of potential replacement alternatives for the Company's Tolk coal-fired generating station, and therefore is not comparable to binding bids to sell power and may not have generated

[9] See Attachment SN-2, SPS's response to AXM 1-2.

[10] See HIGHLY SENSITIVE Attachment SN-3.

interest from parties with planned resources located in the vicinity of the Harrington Station which could meet reserve and voltage regulation requirements.

Q. DOES SPS HAVE ADEQUATE TIME TO CONDUCT A NEW COMPETITIVE BIDDING PROCESS TO OBTAIN BETTER INFORMATION REGARDING REPLACEMENT CAPACITY ALTERNATIVES FOR THE HARRINGTON UNITS?

A. I think so, but it would need to proceed with the new bidding process expeditiously. In addition, SPS could potentially still defer the need for replacement of the Harrington coal units in 2025 for several years by deferring its current plans to retire approximately 650 MW of capacity supplied from other SPS gas-fired units over the next several years or perhaps relying on short-term capacity purchases as it has in the past. While perhaps not optimal, this would provide SPS with additional time to solicit binding bids for replacement resources to be located at or near the Harrington Station site and allow time for the Company to refine its current estimates of interconnection costs for new plants which are a primary driver of the cost of replacement capacity options for the Harrington units.

Q. ARE THERE ANY OTHER ADVANTAGES TO DELAYING A FINAL DECISION TO CONVERT THE HARRINGTON UNITS TO NATURAL GAS?

A. Yes. As indicated by SPS's July 2021 Integrated Resource Plan ("IRP"), SPS has identified new gas-fired combustion turbines as the best resource for serving the Company's future system capacity needs, and new combustion turbines could be located at the Harrington Station site to minimize interconnection costs. Gas-fired combustion turbines would be better suited than the converted Harrington units to supply the Company's requirements for capacity reserves, voltage regulation, and renewable energy support. In fact, SPS's 2021 IRP indicates that new gas-fired combustion turbines are the preferred resource for meeting the Company's forecasted system capacity requirements beginning in 2030. Replacing the Harrington coal units with new gas-fired combustion turbines at the Harrington site, would require the Company to move up by several years its current plans for new combustion turbines. While perhaps slightly more costly in the near-term, this option seems preferable to spending $85 million to convert the relatively old and inefficient Harrington units to burn natural gas when those units are not well-suited to back

up renewable energy resources and are forecasted to produce very little energy benefits for the SPS system.

Q. DID SPS EVALUATE ANY ALTERNATIVES TO CONVERSION OF ALL THREE HARRINGTON UNITS?

A. Yes. As discussed in the next section of my testimony, SPS's CBA for the Harrington conversion project evaluated scenarios that included replacement of one or two (instead of all three) of the Harrington units, and these scenarios had similar and in some cases a lower forecasted revenue requirement than the Company's proposed conversion plan.

Q. PLEASE SUMMARIZE YOUR CONCLUSIONS REGARDING THE NEED FOR SPS'S PROPOSED HARRINGTON CONVERSION PROJECT.

A. SPS appears to have a need to replace the 1,050 MW of capacity due to the planned retirement of the Company's Harrington coal units at the end of 2024, and the proposed Harrington gas conversion project could reliably serve that capacity need at a reasonable cost when compared to most alternatives. However, it is unclear whether the converted Harrington units would provide any energy benefit to the SPS system, or that the converted units are the best alternative to supply voltage regulation or renewable energy backup service requirements of the SPS system. I recommend that SPS consider taking additional time to evaluate whether new gas-fired combustion turbines or other market alternatives located at the Harrington site could prove to be better options than the proposed Harrington gas conversion project.

V. COST/BENEFIT ANALYSIS FOR CONVERSION PROJECT

Q. PLEASE DESCRIBE THE EVALUATION PROCESS USED BY SPS TO ANALYZE COSTS AND BENEFITS OF THE HARRINGTON CONVERSION PROJECT AND OTHER REPLACEMENT ALTERNATIVES.

A. SPS's CBA supporting the proposed Harrington gas conversion project is described in the direct testimony of Company witness Ben Elsey. SPS conducted its initial economic analysis of the disposition of the Harrington coal units in 2019. Based on SPS's analysis, the Company concluded that it should end coal-fired operations at Harrington in 2025 and that by the end of 2024, conversion of the units to burn natural gas was a reasonable and

prudent solution to provide capacity, reliability, and environmental compliance requirements of the SPS system.[11]

In 2021, the Company updated its 2019 economic analysis of the Harrington units to: 1) update critical modeling inputs to reflect changes since the 2019 analysis; 2) make updates for SPS's transition to a new production cost modeling software, EnCompass; and 3) incorporate new pricing information on replacement resources obtained through responses to an RFI submitted by the Company in the Fall of 2020.[12] The Company has used the updated 2021 Economic Analysis to support the Company's application to move forward with the Harrington gas conversion project in this case.[13]

Q. WHAT OPTIONS DID SPS EVALUATE IN THE 2021 HARRINGTON ECONOMIC ANALYSIS?

A. SPS evaluated two basic solutions for disposition of the Harrington coal units: 1) installing the necessary emissions controls to continue operations of the Harrington units using coal; and 2) ceasing Harrington coal operations at the end of 2024 and converting one or two of the units to natural gas and replacement of the remaining units with other resources.[14] In total, the Company evaluated the following six scenarios:[15]

- Scenario 1: Retirement and replacement of all Harrington Units by the end of 2024;
- Scenario 2: Convert all Harrington units to natural gas by the end of 2024;
- Scenario 3: Install Dry Sorbent Injection SO2 controls on all Harrington Units by the end of 2024;
- Scenario 4: Install Spray Dryer Absorbent SO2 controls on all Harrington Units by the end of 2024;

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[12] See *Id.* at 26.

[13] See *Id.*

[14] See *Id.*

[15] See *Id.* at 29.

- Scenario 5: Retire Harrington Units 1 and 2 then convert Harrington 3 to natural gas by the end of 2024; and
- Scenario 6: Retire Harrington Unit 1 then convert Harrington Units 2 and 3 to natural gas by the end of 2024.

Q. WHAT WAS THE STUDY PERIOD ADDRESSED BY SPS'S 2021 ECONOMIC ANALYSIS OF THE HARRINGTON UNIT OPTIONS?

A. The Study Period considered by SPS's 2021 Economic Analysis was the 20-year period, 2022 through 2041.[16]

Q. WHAT WERE THE RESULTS OF SPS'S 2021 BASE CASE ANALYSIS OF THE ABOVE SCENARIOS?

A. The results of SPS's 2021 Base Case analyses for each of the six scenarios are summarized in Table 3 below.

Table 3
Results of 2021 Updated Harrington Economic Analysis
Base Load and Gas Price Forecast + $400/kW Interconnection Cost[17]
(2022-2041 Cumulative NPV, $Millions)

Scenario	Description	NPV 2022-2041	Delta	%Diff
2	Convert All to NG	$11,949	$0	0.0%
1	Retire/Replace All	$12,072	$123	1.0%
3	Install DSI All	$12,388	$439	3.7%
4	Install SDA All	$12,644	$695	5.8%
5	Retire 2/Convert 1	$12,011	$62	0.5%
6	Retire 1/Convert 2	$11,944	-$5	0.0%

Q. WHAT CONCLUSIONS CAN YOU DRAW FROM THE ABOVE RESULTS?

A. The above base case results of Harrington replacement and conversion options indicate that Scenarios 1, 2, 5 and 6 are essentially equal because the difference between these cases is only 1% or less, which is well within the expected range of modeling error for a 20-year forecast of a large utility system operating within a regional market. This is particularly

[16] See *Id.* at 32.

[17] See *Id.*

true given the volatility of natural gas and SPP market prices, as well as the uncertainty that exists regarding transmission interconnections costs, which SPS assumed to be $400/kW (~$400 million) higher for the Harrington in Scenario 1 (Retire and replace all Harrington units). The Independent Evaluator Report on SPS's Analysis of the Harrington Station disposition options reaches a similar conclusion.[18]

Q. DID SPS CONDUCT ANY SENSITIVITY ANALYSES IN EVALUATING THE ABOVE SCENARIOS?

A. Yes. SPS's 2021 Updated Economic Analysis for Harrington included several sensitivity analyses that addressed uncertainty in key variables, including: 1) base, high, and low natural gas and market energy price forecasts; 2) a range of sensitivities for transmission interconnection costs for new resources ($200/kW, $400/kW and $600/kW); and 3) financial (low) and planning (high) load forecasts.[19]

Q. DO THE SENSITIVITY CASES SPS EVALUATED SIGNIFICANTLY CHANGE THE BASE CASE RANKINGS OF THE SCENARIOS?

A. No. For example, as summarized in Table 4 below, under the Financial Load Forecast scenario, which reflects lower forecasted peak demand growth, the relative rankings of the scenarios are similar to the Base Case results, and the differences remain very small, with the cost of Scenario 1 being only 0.4% higher than the total modeled production costs of the proposed conversion option (Scenario 2) over the 20-year study period.

[18] See Direct Testimony of D. Dean Koujak, Attachment DDK-1 at page 15 of 16 ("Koujak Dir. at __.").

[19] See Elsey Dir. at 30.

Table 4
Results of 2021 Updated Harrington Economic Analysis
Low Load, Base Gas Price Forecast + $400/kW Interconnection Cost[20]
(2022-2041 Cumulative NPV, $Millions)

Scenario	Description	NPV 2022-2041	Delta	%Diff
2	Convert All to NG	$10,388	$0	0.0%
1	Retire/Replace All	$10,435	$47	0.4%
3	Install DSI All	$10,831	$443	3.7%
4	Install SDA All	$11,085	$698	5.8%
5	Retire 2/Convert 1	$10,415	$27	0.2%
6	Retire 1/Convert 2	$10,358	-$29	-0.2%

In the high gas price sensitivity analysis, the forecasted difference in costs between Scenarios 1 and 2 are also very small (0.4%), as summarized in Table 5 below.

Table 5
Results of 2021 Updated Harrington Economic Analysis
Base Load, High Gas Price Forecast + $400/kW Interconnection Cost[21]
(2022-2041 Cumulative NPV, $Millions)

Scenario	Description	NPV 2022-2041	Delta	%Diff
2	Convert All to NG	$10,388	$0	0.0%
1	Retire/Replace All	$10,435	$47	0.4%
3	Install DSI All	$10,831	$443	3.7%
4	Install SDA All	$11,085	$697	5.8%
5	Retire 2/Convert 1	$10,415	$27	0.2%
6	Retire 1/Convert 2	$10,358	-$30	-0.3%

Q. HOW DOES THE LEVEL OF ASSUMED INTERCONNECTION COSTS FOR NEW RESOURCES IMPACT THE SCENARIO RANKINGS?

A. As reflected in Table 6 below, the Company's sensitivity analysis using the low end ($200/kW) of SPS's forecasted interconnection costs along with the base case natural gas price and Planning Load Forecast, also predicts a smaller cost difference (0.6%) between the conversion project (Scenario 2) and the retire-and-replace alternative (Scenario 1).

[20] Source is Elsey Dir. at Attachment BRE-1, page 1 of 6.

[21] Source is Elsey Dir. at Attachment BRE-1, page 2 of 6.

Again, this level of difference is within the expected range of modeling error for a 20-year production modeling forecast of SPS's system.

Table 6
Results of 2021 Updated Harrington Economic Analysis
Base Load, Base Gas Price Forecast + $200/kW Interconnection Cost[22]
(2022-2041 Cumulative NPV, $Millions)

Scenario	Description	NPV 2022-2041	Delta	%Diff
2	Convert All to NG	$11,803	$0	0.0%
1	Retire/Replace All	$11,870	$67	0.6%
3	Install DSI All	$12,221	$418	3.5%
4	Install SDA All	$12,478	$675	5.6%
5	Retire 2/Convert 1	$11,798	-$5	0.0%
6	Retire 1/Convert 2	$11,777	-$26	-0.2%

Q. WHAT ARE YOUR OVERALL CONCLUSIONS BASED ON THE RESULTS OF SPS'S 2021 ECONOMIC ANALYSIS OF HARRINGTON STATION DISPOSITION ALTERNATIVES?

A. SPS's 2021 Economic Analysis of Harrington Station gas conversion and retirement alternatives generally indicates that the cost of converting all three Harrington coal units to burn natural gas is essentially the same as the costs of retiring and replacing one or more of the Harrington units. This conclusion is based on the fact that the predicted 20-year Net Present Value ("NPV") cost differences between the proposed Scenario 2 and alternative retirement Scenarios 1, 5 and 6 are at or below 1% of the total costs modeled, which is well within the range of modeling error for the 20-year analysis.

Additionally, the converted Harrington Units: 1) would have only approximately 15 years of remaining life; 2) are not forecasted by SPS to provide significant energy benefits because of the relatively low operating efficiency and high variable operating costs; and 3) are not optimally suited to provide the quick start/high ramp rate service required for backup of the Company's intermittent renewable resources. Given the lack of any certain economic or operational advantage of SPS's proposed Harrington gas conversion project,

[22] Source is Elsey Dir. at Attachment BRE-1, page 3 of 6.

I conclude that this project is not the best available choice for replacing the generating capacity loss due to the planned retirement of the Harrington coal units at the end of 2024.

Q. DOES SCENARIO 1 OFFER OTHER POTENTIAL ADVANTAGES OVER CONVERTING ALL HARRINGTON UNITS TO NATURAL GAS?

A. Yes. Under Scenario 1, SPS could use the existing Harrington Station infrastructure and transmission interconnection facilities for new gas-fired combustion turbines which SPS plans to add by 2030 according to the Company's July 2021 IRP. This would likely reduce the forecasted cost of Scenario 1 from what was assumed in SPS's 2021 Economic Analysis, which assumes that other replacement resources incur an interconnection cost of $400/kW, which equates to approximately $420 Million of additional cost that is added to the evaluated costs of such resources.

It also may be economically feasible to accelerate the in-service dates of new combustion turbines at the Harrington site if necessary to address any voltage regulation concerns experienced following retirement of the existing Harrington coal units. In addition, under Scenario 1, SPS may be able to take advantage of tax credits offered for new solar and wind resources, which the Company's 2021 Harrington economic analysis indicates would be added to replace a portion of the 1,050 MW capacity loss caused by the planned retirement of the Harrington coal units at the end of 2024.

VI. CONCLUSIONS AND RECOMMENDATIONS

Q. PLEASE SUMMARIZE YOUR CONCLUSIONS AND RECOMMENDATIONS REGARDING SPS'S PROPOSED HARRINGTON GAS CONVERSION PROJECT.

A. SPS has entered into an agreement with the TCEQ to retire the Harrington Station coal units at the end of 2024. The Company's load forecasts indicate that this will create a need for replacement capacity beginning in 2025, which SPS proposes to fill by converting all three Harrington units to operate on natural gas. SPS's CBA forecasts indicate that the cost of retiring and replacing the Harrington units with new renewable energy and gas-fired combustion turbine resources is less than 1% higher than the cost of the Harrington gas conversion project under the 20-year study period evaluated by SPS. This forecasted 1% economic advantage of the gas conversion project is small compared to the accuracy of

SPS's CBA, which is based on 20-year forecasts of SPS system operations and production costs and SPP market prices for scenarios with and without the conversion project.

The small forecasted cost advantage of the gas conversion project is influenced by SPS's questionable base case assumption that replacement resources for the 1,050 MW Harrington Project would incur a $400/kW ($420 million) of transmission interconnection costs while the Harrington gas conversion project would have no interconnection cost. This interconnection cost assumption is not certain and makes up much of the forecasted benefits of the gas conversion project.

Based on the relatively small and uncertain forecasted cost benefit of SPS's gas conversion proposal and the anticipated operational benefits of the Retire and Replace alternative, I have concluded that the Harrington gas conversion project is not the best available alternative for replacement of the Harrington coal units. I am concerned that with the gas conversion project, approximately 20% of the Company's total firm generating capacity, would be supplied by older converted gas units that SPS's production modeling studies indicate will rarely operate over the remaining 10-15 years of their service lives.

Moreover, under the Retire and Replace alternative, SPS would replace the Harrington coal units with new combustion turbine resources that would be far better suited to provide the quick start and peaking service capability that is required for effective back-up of renewable energy resources and other requirements of the SPS system. Therefore, I recommend that the Commission deny SPS's request for approval of the Harrington gas conversion project.

However, if the Commission decides to approve the Harrington gas conversion project, I recommend that it place certain conditions on approval of the Project including: 1) the total recoverable capital cost of the Project and required pipeline will be subject to a soft cap of $70 million (Total Company) which represents the midpoint of SPS's estimated range of capital costs for the Project; 2) the Commission direct SPS to issue an RFP within 45 days of the Final Order in this case for binding bids to provide replacement generating resources (including required interconnection costs) that are capable of supplying the capacity and reliability needs arising from SPS's decision to cease operating the Harrington units on

coal by the end of 2024 and present its evaluation of any proposals received when the Company seeks final approval and cost recovery for the Harrington gas conversion project; and 3) the Company obtains approval for the Project from New Mexico PSC.

Q. DOES THAT CONCLUDE YOUR TESTIMONY?

A. Yes.

SOAH DOCKET NO. 473-22-1073
PUC DOCKET NO. 52485

APPLICATION OF SOUTHWESTERN PUBLIC SERVICE COMPANY TO AMEND ITS CERTIFICATE OF CONVENIENCE AND NECESSITY TO CONVERT HARRINGTON GENERATING STATION FROM COAL TO NATURAL GAS	**§**	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

DIRECT TESTIMONY AND ATTACHMENTS

OF SCOTT NORWOOD

ATTACHMENT SN-1:

Background and Experience of Scott Norwood

DON SCOTT NORWOOD

Norwood Energy Consulting, L.L.C.

P. O. Box 30197
Austin, Texas 78755-3197
scott@scottnorwood.com
(512) 297-1889

SUMMARY

Scott Norwood is an energy consultant with over 39 years of utility industry experience in the areas of regulatory consulting, resource planning, power plant operations and energy procurement. His clients include government agencies, publicly-owned utilities, public service commissions, municipalities and various electric consumer interests. Over the last 15 years Mr. Norwood has presented expert testimony on electric utility ratemaking, resource planning, and electric utility restructuring issues in over 200 regulatory proceedings in Arkansas, Georgia, Iowa, Illinois, Michigan, Missouri, New Jersey, Oklahoma, South Dakota, Texas, Virginia, Washington and Wisconsin.

Prior to founding Norwood Energy Consulting in January of 2004, Mr. Norwood was employed for 18 years by GDS Associates, Inc., a Marietta, Georgia based energy consulting firm. Mr. Norwood was a Principal of GDS and directed the firm's Deregulated Services Department which provided a range of consulting services including merchant plant due diligence studies, deregulated market price forecasts, power supply planning and procurement projects, electric restructuring policy analyses, and studies of power plant dispatch and production costs.

Before joining GDS, Mr. Norwood was employed by the Public Utility Commission of Texas as Manager of Power Plant Engineering from 1984 through 1986. He began his career in 1980 as Staff Electrical Engineer with the City of Austin's Electric Utility Department where he was in charge of electrical maintenance and design projects at three gas-fired power plants.

Mr. Norwood is a graduate of the college of electrical engineering of the University of Texas.

EXPERIENCE

The following summaries are representative of the range of projects conducted by Mr. Norwood over his 30-year consulting career.

Regulatory Consulting

Oklahoma Industrial Energy Consumers - Assisted client with technical and economic analysis of proposed EPA regulations and compliance plans involving control of air emissions and potential conversion of coal-to-gas conversion options.

Cities Served by Southwestern Electric Power Company – Analyzed and presented testimony regarding the prudence of a $1.7 billion coal-fired power plant and related settlement agreements with Sierra Club.

New York Public Service Commission - Conducted inter-company statistical benchmarking analysis of Consolidated Edison Company to provide the New York Public Service Commission with guidance in determining areas that should be reviewed in detailed management audit of the company.

Oklahoma Industrial Energy Consumers - Analyzed and presented testimony on affiliate energy trading transactions by AEP in ERCOT.

Virginia Attorney General – Analyzed and presented testimony regarding distribution tap line undergrounding program proposed by Dominion Virginia Power Company.

Cities Served by Southwestern Electric Power Company – Analyzed and presented testimony regarding the prudence of the utility's decision to retire the Welsh Unit 2 coal-fired generating unit in conjunction with a litigation settlement agreement with Sierra Club.

Georgia Public Service Commission - Presented testimony before the Georgia Public Service Commission in Docket 3840-U, providing recommendations on nuclear O&M levels for Hatch and Vogtle and recommending that a nuclear performance standard be implemented in the State of Georgia.

Oklahoma Industrial Energy Consumers - Analyzed and presented testimony addressing power production and coal plant dispatch issues in fuel prudence cases involving Oklahoma Gas and Electric Company.

Georgia Public Service Commission - Analyzed and provided recommendations regarding the reasonableness of nuclear O&M costs, fossil O&M costs and coal inventory levels reported in GPC's 1990 Surveillance Filing.

City of Houston - Analyzed and presented comments on various legislative proposals impacting retail electric and gas utility operations and rates in Texas.

New York Public Service Commission - Conducted inter-company statistical benchmarking analysis of Rochester Gas & Electric Company to provide the New York Public Service Commission with guidance in determining areas which should be reviewed in detailed management audit of the company.

Virginia Attorney General – Analyzed and presented testimony regarding an accelerated vegetation management program and rider proposed by Appalachian Power Company.

Oklahoma Attorney General – Analyzed and presented testimony regarding fuel and purchased power, depreciation and other expense items in Oklahoma Gas & Electric Company's 2001 rate case before the Oklahoma Corporation Commission.

City of Houston - Analyzed and presented testimony regarding fossil plant O&M expense levels in Houston Lighting & Power Company's rate case before the Public Utility Commission of Texas.

City of El Paso - Analyzed and presented testimony regarding regulatory and technical issues related to the Central & Southwest/El Paso Electric Company merger and rate proceedings before the PUCT, including analysis of merger synergy studies, fossil O&M and purchased power margins.

Residential Ratepayer Consortium - Analyzed Fermi 2 replacement power and operating performance issues in fuel reconciliation proceedings for Detroit Edison Company before the Michigan Public Service Commission.

Residential Ratepayer Consortium - Analyzed and prepared testimony addressing coal plant outage rate projections in the Consumer's Power Company fuel proceeding before the Michigan Public Service Commission.

City of El Paso - Analyzed and developed testimony regarding Palo Verde operations and maintenance expenses in El Paso Electric Company's 1991 rate case before the Public Utility Commission of Texas.

City of Houston - Analyzed and developed testimony regarding the operations and maintenance expenses and performance standards for the South Texas Nuclear Project, and operations and maintenance expenses for the Limestone and Parish coal-fired power plants in HL&P's 1991 rate case before the PUCT.

City of El Paso - Analyzed and developed testimony regarding Palo Verde operations and maintenance expenses in El Paso Electric Company's 1990 rate case before the Public Utility Commission of Texas. Recommendations were adopted.

Energy Planning and Procurement Services

Virginia Attorney General – Review and provide comments or testimony regarding annual integrated resource plan filings made by Dominion Virginia Power and Appalachian Power Company.

Dell Computer Corporation – Negotiated retail power supply agreement for Dell's Round Rock, Texas facilities producing annual savings in excess of $2 million.

Texas Association of School Boards Electric Aggregation Program – Serve as TASB's

consultant in the development, marketing and administration of a retail electric aggregation program consisting of 2,500 Texas schools with a total load of over 300 MW. Program produced annual savings of more than $30 million in its first year.

Oklahoma Industrial Energy Consumers - Analyzed and drafted comments addressing integrated resource plan filings by Public Service Company of Oklahoma and Oklahoma Gas and Electric Company.

S.C. Johnson - Analyzed and presented testimony addressing Wisconsin Electric Power Company's $4.1 billion CPCN application to construct three coal-fired generating units in southeast Wisconsin.

Oklahoma Industrial Energy Consumers - Analyzed wind energy project ownership proposals by Oklahoma Gas and Electric Company and presented testimony addressing project economics and operational impacts.

City of Chicago, Illinois Attorney General, Illinois Citizens' Utility Board - Analyzed Commonwealth Edison's proposed divestiture of the Kincaid and State Line power plants to SEI and Dominion Resources.

Georgia Public Service Commission - Analyzed and presented testimony on Georgia Power Company's integrated resource plan in a certification proceeding for an eight unit, 640 MW combustion turbine facility.

South Dakota Public Service Commission - Evaluated integrated resource plan and power plant certification filing of Black Hills Power & Light Company.

Shell Leasing Co. - Evaluated market value of 540 MW western coal-fired power plant.

Community Energy Electric Aggregation Program – Served as Community Energy's consultant in the development, marketing and start-up of a retail electric aggregation program consisting of major charitable organizations and their donors in Texas.

Austin Energy – Conducted competitive solicitation for peaking capacity. Developed request for proposal, administered solicitation and evaluated bids.

Austin Energy - Provided technical assistance in the evaluation of the economic viability of the

City of Austin's ownership interest in the South Texas Project.

Austin Energy - Assisted with regional production cost modeling analysis to assess production cost savings associated with various public power merger and power pool alternatives.

Sam Rayburn G&T Electric Cooperative - Conducted competitive solicitation for peaking capacity. Developed request for proposal, administered solicitation and evaluated bids.

Rio Grande Electric Cooperative, Inc. - Directed preparation of power supply solicitation and conducted economic and technical analysis of offers.

Virginia Attorney General – Review and provide comments or testimony regarding annual demand-side management program programs and rider proposals made by Dominion Virginia Power and Appalachian Power Company.

Austin Energy – Conducted modeling to assess potential costs and benefits of a municipal power pool in Texas.

Electric Restructuring Analyses

Electric Power Research Institute - Evaluated regional resource planning and power market dispatch impacts on rail transportation and coal supply procurement strategies and costs.

Arkansas House of Representatives – Critiqued proposed electric restructuring legislation and identified suggested amendments to provide increased protections for small consumers.

Virginia Legislative Committee on Electric Utility Restructuring – Presented report on status of stranded cost recovery for Virginia's electric utilities.

Georgia Public Service Commission – Developed models and a modeling process for preparing initial estimates of stranded costs for major electric utilities serving the state of Georgia.

City of Houston – Evaluated and recommended adjustments to Reliant Energy's stranded cost proposal before the Public Utility Commission of Texas.

Oklahoma Attorney General – Evaluated and advised the Attorney General on technical, economic and regulatory policy issues arising from various electric restructuring proposals considered by the Oklahoma Electric Restructuring Advisory Committee.

State of Hawaii Department of Business, Economics and Tourism – Evaluated electric restructuring proposals and developed models to assess the potential savings from deregulation of the Oahu power market.

Virginia Attorney General - Served as the Attorney General's consultant and expert witness in the evaluation of electric restructuring legislation, restructuring rulemakings and utility proposals addressing retail pilot programs, stranded costs, rate unbundling, functional

separation plans, and competitive metering.

Western Public Power Producers, Inc. - Evaluated operational, cost and regional competitive impacts of the proposed merger of Southwestern Public Service Company and Public Service Company of Colorado.

Iowa Department of Justice, Consumer Advocate Division - Analyzed stranded investment and fuel recover issues resulting from a market-based pricing proposal submitted by MidAmerican Energy Company.

Cullen Weston Pines & Bach/Citizens' Utility Board - Evaluated estimated costs and benefits of the proposed merger of Wisconsin Energy Corporation and Northern States Power Company (Primergy).

City of El Paso - Evaluated merger synergies and plant valuation issues related to the proposed acquisition and merger of El Paso Electric Company and Central & Southwest Company.

Rio Grande Electric Cooperative, Inc. - Analyzed stranded generation investment issues for Central Power & Light Company.

Power Plant Management

City of Austin Electric Utility Department - Analyzed the 1994 Operating Budget for the South Texas Nuclear Project (STNP) and assisted in the development of long-term performance and expense projections and divestiture strategies for Austin's ownership interest in the STNP.

City of Austin Electric Utility Department - Analyzed and provided recommendations regarding the 1991 capital and O&M budgets for the South Texas Nuclear Project.

Sam Rayburn G&T Electric Cooperative - Developed and conducted operational monitoring program relative to minority owner's interest in Nelson 6 Coal Station operated by Gulf States Utilities.

KAMO Electric Cooperative, City of Brownsville and Oklahoma Municipal Power Agency - Directed an operational audit of the Oklaunion coal-fired power plant.

Sam Rayburn G&T Electric Cooperative - Conducted a management/technical assessment of the Big Cajun II coal-fired power plant in conjunction with ownership feasibility studies for the project.

Kamo Electric Power Cooperative - Developed and conducted operational monitoring program for client's minority interest in GRDA Unit 2 Coal Fired Station.

Northeast Texas Electric Cooperative - Developed and conducted operational monitoring program concerning NTEC's interest in Pirkey Coal Station operated by Southwestern Electric Power Company and Dolet Hills Station operated by Central Louisiana Electric Company.

Corn Belt Electric Cooperative/Central Iowa Power Cooperative - Perform operational monitoring and budget analysis on behalf of co-owners of the Duane Arnold Energy Center.

PRESENTATIONS

Quantifying Impacts of Electric Restructuring: Dynamic Analysis of Power Markets, 1997 NARUC Winter Meetings, Committee on Finance and Technology.

Quantifying Costs and Benefits of Electric Utility Deregulation: Dynamic Analysis of Regional Power Markets, International Association for Energy Economics, 1996 Annual North American Conference.

SOAH DOCKET NO. 473-22-1073
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APPLICATION OF SOUTHWESTERN PUBLIC SERVICE COMPANY TO AMEND ITS CERTIFICATE OF CONVENIENCE AND NECESSITY TO CONVERT HARRINGTON GENERATING STATION FROM COAL TO NATURAL GAS	§	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

DIRECT TESTIMONY AND ATTACHMENTS

OF SCOTT NORWOOD

ATTACHMENT SN-2:

SPS's Response to AXM 1-2

QUESTION NO. AXM 1-2:

Please provide the required start-up time (hours), ramp rate and load following capability of the converted Harrington units as reflected in each of the 2019 and 2021 updated economic analyses described in Company witness Elsey's direct testimony.

RESPONSE:

For the 2021 updated economic analysis, the minimum and maximum output of the Harrington Units 2 and 3 is 120 MW and 350 MW, respectively. The minimum and maximum output of Harrington Unit 1 is 120 MW and 345 MW, respectively. The ramp rate of each Harrington Unit was modeled at 2 MW per minute. After reviewing and testing preliminary results, and to speed up the processing time, SPS did not incorporate start-up times for SPS-owned generating units as it did not materially change the results.

For the 2019 economic analysis, the minimum and maximum output for the Harrington units is as follows:

Unit 1: 119 MW and 339 MW
Unit 2: 119 MW and 342 MW
Unit 3: 126 MW and 350 MW

As described in the Direct Testimony of Ben R. Elsey, the 2019 Harrington analysis was conducted in Strategist. As Strategist is not an hourly dispatch production cost model, hourly inputs such as start-up time, and sub-hourly inputs such as ramp rate were not included in the analysis.

Preparer: Ben R. Elsey
Sponsor: Ben R. Elsey

SOAH DOCKET NO. 473-22-1073
PUC DOCKET NO. 52485

APPLICATION OF SOUTHWESTERN PUBLIC SERVICE COMPANY TO AMEND ITS CERTIFICATE OF CONVENIENCE AND NECESSITY TO CONVERT HARRINGTON GENERATING STATION FROM COAL TO NATURAL GAS	§	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

DIRECT TESTIMONY AND ATTACHMENTS

OF SCOTT NORWOOD

REDACTED

HIGHLY SENSITIVE ATTACHMENT SN-3:

SPS Generation Forecast for Harrington Gas Units (2025-2036)

[redacted]

[redacted]

[redacted]

SOAH DOCKET NO. 473-22-1073
PUC DOCKET NO. 52485

APPLICATION OF SOUTHWESTERN PUBLIC SERVICE COMPANY TO AMEND ITS CERTIFICATE OF CONVENIENCE AND NECESSITY TO CONVERT HARRINGTON GENERATING STATION FROM COAL TO NATURAL GAS	§ § § § § § § §	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

DIRECT TESTIMONY AND ATTACHMENTS

OF SCOTT NORWOOD

REDACTED

HIGHLY SENSITIVE WORKPAPERS

SPS Planning Table Forecast (Summer 2021 Load Forecast)

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Total Accredited Capacity	4,924	4,608	4,582	4,364	4,249	4,246	3,997	3,751	2,679	2,118	1,796
Planning Load Forecast	4,264	4,236	4,326	4,400	4,471	4,533	4,582	4,670	4,731	4,801	4,842
Total Planning Reserve Margin at 12%	512	508	519	528	536	544	550	560	568	576	581
Resource Position - Assuming all Harrington Units are Converted (MW)	**148**	**(136)**	**(264)**	**(564)**	**(758)**	**(830)**	**(1,135)**	**(1,479)**	**(2,620)**	**(3,258)**	**(3,627)**
Less Harrington 1, 2, 3 (MW)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)
Resource Position - Assuming all Harrington Units are retired (MW)	**(902)**	**(1,186)**	**(1,314)**	**(1,614)**	**(1,808)**	**(1,880)**	**(2,185)**	**(2,529)**	**(3,670)**	**(4,308)**	**(4,677)**

SPS Financial Table Forecast (Summer 2021 Load Forecast)

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Total Accredited Capacity	4,924	4,608	4,582	4,364	4,249	4,246	3,997	3,751	2,679	2,118	1,796
Financial Load Forecast	3,932	3,864	3,899	3,932	3,966	3,991	4,022	4,049	4,083	4,114	4,158
Total Planning Reserve Margin at 12%	472	464	468	472	476	479	483	486	490	494	499
Resource Position - Assuming all Harrington Units are Converted (MW)	**520**	**280**	**215**	**(39)**	**(193)**	**(224)**	**(507)**	**(783)**	**(1,894)**	**(2,489)**	**(2,861)**
Less Harrington 1, 2, 3 (MW)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)
Resource Position - Assuming all Harrington Units are retired (MW)	**(530)**	**(770)**	**(835)**	**(1,089)**	**(1,243)**	**(1,274)**	**(1,557)**	**(1,833)**	**(2,944)**	**(3,539)**	**(3,911)**

SPS Planning Table Forecast (Spring 2021 Load Forecast)

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Total Accredited Capacity	5,105	4,852	4,832	4,598	4,486	4,486	4,240	3,997	2,928	2,354	1,880
Planning Load Forecast	4,269	4,240	4,333	4,403	4,464	4,522	4,565	4,652	4,706	4,767	4,799
Total Planning Reserve Margin at 12%	512	509	520	528	536	543	548	558	565	572	576
Resource Position - Assuming all Harrington Units are Converted (MW)	**323**	**103**	**(21)**	**(334)**	**(514)**	**(578)**	**(873)**	**(1,213)**	**(2,342)**	**(2,985)**	**(3,495)**
Less Harrington 1, 2, 3 (MW)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)
Resource Position - Assuming all Harrington Units are retired (MW)	**(727)**	**(947)**	**(1,071)**	**(1,384)**	**(1,564)**	**(1,628)**	**(1,923)**	**(2,263)**	**(3,392)**	**(4,035)**	**(4,545)**

SPS Financial Table Forecast (Spring 2021 Load Forecast)

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Total Accredited Capacity	5,105	4,852	4,832	4,598	4,486	4,486	4,240	3,997	2,928	2,354	1,880
Financial Load Forecast	3,937	3,867	3,905	3,934	3,961	3,982	4,007	4,033	4,061	4,085	4,122
Total Planning Reserve Margin at 12%	472	464	469	472	475	478	481	484	487	490	495
Resource Position - Assuming all Harrington Units are Converted (MW)	**696**	**521**	**458**	**191**	**50**	**26**	**(248)**	**(520)**	**(1,621)**	**(2,221)**	**(2,736)**
Less Harrington 1, 2, 3 (MW)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)
Resource Position - Assuming all Harrington Units are retired (MW)	**(354)**	**(529)**	**(592)**	**(859)**	**(1,000)**	**(1,024)**	**(1,298)**	**(1,570)**	**(2,671)**	**(3,271)**	**(3,786)**

SPS Planning Table Forecast (Summer 2021 Load Forecast)

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Less Harrington 1, 2, 3 (MW)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)
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Less Harrington 1, 2, 3 (MW)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)	(1,050)
Resource Position - Assuming all Harrington Units are retired (MW)	**(530)**	**(770)**	**(835)**	**(1,089)**	**(1,243)**	**(1,274)**	**(1,557)**	**(1,833)**	**(2,944)**	**(3,539)**	**(3,911)**